

**PATENT APPLICATION**  
**Serial No. 10/043,709****REMARKS**

In further support of the claims presented, Applicants submit the following remarks.

**I. Rejection Under 35 U.S.C. § 102(e)**

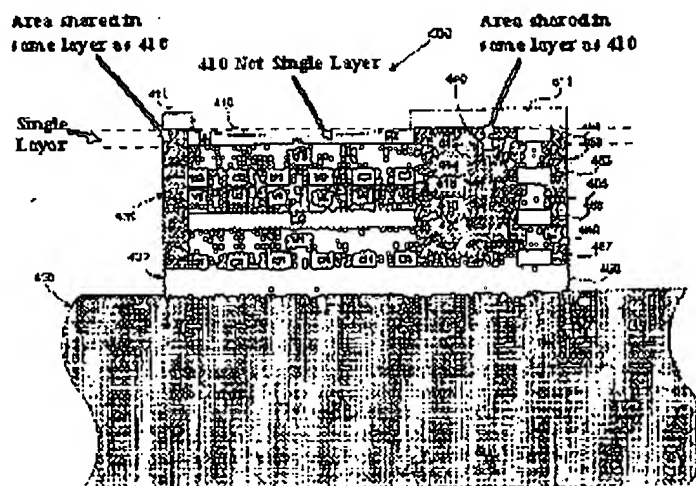
The Examiner rejected claims 1, 3-4, 8 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,198,170 to Zhao.

Regarding claim 1, the Examiner argued that Zhao discloses a method for forming a wiring bond pad utilized in a wire bonding operation on an integrated circuit (IC) device comprising the steps of: configuring a wiring bond pad to comprise a single metal layer (citing layer 410, Fig. 4, column 10, line 37 of Zhao), wherein the single metal layer 410 does not share with any other material, and positioning at least one IC (citing column 10, line 15 of Zhao) to thereby conserve IC space and improve wiring bond pad efficiency as a result of configuring the wiring bond pad to comprise a single metal layer 410. The Applicants respectfully disagree with this assessment. This rejection is respectfully traversed as indicated herein.

Applicants' claim 1 is generally directed toward a method for forming a wiring bond pad utilized in wire bonding operations on an integrated circuit device, said method comprising the steps of: configuring a wiring bond pad to comprise a single metal layer, wherein said single metal layer does not share said single metal layer with any other material; and positioning at least one integrated circuit device below said wiring bond pad to thereby conserve integrated circuit space and improve wiring bond pad efficiency as a result of configuring said wiring bond pad to comprise a single metal layer.

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The Examiner is incorrect in asserting that bonding pad 410 of Zhao comprises a *single metal layer*. As Fig. 4 of Zhao demonstrates, a portion of structure 430 and a portion of the area below structure 411 of Zhao are *shared* by bonding pad 410 at the same level. Thus, bonding pad 410 does not comprise a single metal layer, but is merely one layer of several different structures at the same level. Fig. 4 of Zhao is illustrated below:



Thus, it is clear from Fig. 4 that bonding pad 410 is not composed of a single layer but is located in a layer in which other structures are shared within the same layer. This single layer is located between the dashed lines indicated above. Thus, the Examiner is incorrect in referring to bonding pad 410 as a "single metal layer" 410 because although bonding pad 410 is formed from an M4 metal, this metal does not encompass the *entire* length and gap between the dashed lines indicated above, but instead shares portions of other structures within the same layer.

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Although bonding pad 410 is described at column 10, line 37 as constituting an M4 layer, the Applicants, as indicated at paragraph 0028 of their specification, refer to a "single layer Cu metal-8 bond pad," which is different from an M4 layer. Although column 10, lines 37-38 indicate that M4 is the same layer in which bonding pad 410 is located, it is clear from Fig. 4 of Zhao that the M4 bonding pad does not comprise a single metal layer because at that level, other areas such as portions of structure 430 and the area immediately below structure 411 level with bonding 410 share the same layer.

Applicants' invention is innovative because Applicants teach a bonding pad structure, including methods thereof, that consumes the *entire* layer (i.e., the entire length and level of a single layer across an entire substrate area). Zhao does disclose an insulator 432 (see Fig. 4), which consumes an entire level or layer. If this were a bonding pad, then Zhao would clearly disclose the same type of single metal layer bonding pad taught by Applicants' invention. Insulator 432, however, is not a bonding pad although it does consume the entire length of the overall support structure 400 (minus substrate 450). As Applicants point out in paragraph 007 of their specification, "current wiring pad design rules do not permit only one layer for wiring bond configurations, due to wire bonding stress-reduced fractures that can result during packaging. For these reasons, the Applicants believe that the Examiner's argument provided above is not sufficient to sustain a rejection to claim 1. Applicants therefore request that the rejection to claim 1 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,198,170 to Zhao be withdrawn.

Regarding claims 3 and 4, the Examiner argued that Zhao discloses a method for forming a wiring bond pad further comprising the step of: locating a single metal layer 410 above a plurality of inter-metal dielectric layers 422, 420, 418, 416 and 414 (citing column 14, lines 29-31 of Zhao), further comprising at least one IC device below a plurality of inter-metal dielectric layers (citing column 10, line 15 of Zhao). Again, for the reasons provided above, the Applicants believe that bonding pad 410 does not constitute a single metal layer /

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as Applicants utilize that term. Instead, bonding pad 410 comprises a single metal (M4) but not a single layer, because the entire level region at which bonding pad 410 is located is also shared by a portion of structure 430 and a portion of the area immediately below structure 411. Additionally, a portion of structure 461 (i.e., the white square of Fig. 4) is also located at that same level and layer. Thus, the Applicants respectfully request that the rejection to claims 3 and 4 be withdrawn.

Regarding claims 8 and 11, Zhao discloses a method for forming a wiring bond pad wherein the single metal layer 410 comprises a copper layer (citing column 14, line 25) having a thickness of approximately  $10\text{K}\text{\AA}$  (citing column 14, line 56). Applicants believe that it is irrelevant that bonding pad 410 comprises copper, because as explained above, bonding pad 410 of Zhao does not comprise a single metal layer. Instead, bonding pad 410 comprises a single metal (M4) but not a single layer, because the entire level region at which bonding pad 410 is located is also shared by a portion of structure 430 and a portion of the area immediately below structure 411. Additionally, a portion of structure 461 (i.e., the white square of Fig. 4) is also located at that same level and layer. Thus, Applicants respectfully request that the rejection claims 8 and 11 be withdrawn.

**II. Rejections Under 35 U.S.C. § 103(a)**

Claims 2, 5-7, 9-10, 12 and 25-28 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Zhao (U.S. Patent No. 6,198,170) in view of Ho et al (U.S. Patent No. 6,417,088). This rejection is respectfully traversed as discussed herein.

Regarding claims 2, 9-10 and 12, the Examiner admitted that Zhao does not disclose an aluminum buffer layer and bonding layer immediately above the single metal layer, wherein the aluminum buffer layer has a thickness in a range of  $10\text{K}\text{\AA}$  -  $20\text{K}\text{\AA}$ . The Examiner argued, however, that the Ho references discloses a method for forming a wiring bond pad (citing Fig. 6), including an aluminum buffer layer 52 (citing column 3, line 3 of

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Ho) and a bonding layer 60 (citing column 4, lines 53 of Ho) immediately above a metal layer 30, wherein the aluminum buffer layer has a thickness in a range of 5000Å (citing column 4, line 35 of Ho). The Examiner therefore submitted that it would have been obvious to one of ordinary skill in the art to use the buffer layer 52 teach of Ho in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. The Examiner referred to In Re Aller, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Additionally, the Examiner argued that such a buffer layer would have increased the adhesion between the bond pad and the bonding layer as taught by Ho (citing column 4, lines 30-32 of Ho). The Applicants believe this argument is irrelevant in light of the fact that Fig. 4 of Zhao does NOT disclose a bonding pad 410 formed from a single metal layer bonding pad, and thus cannot properly be combined with Zhao to teach or suggest the invention taught by Applicants' invention.

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Additionally, the Examiner has not provided a proper motivation for using the thickness range of 5000Å of Ho to obtain a thickness in a range 10KÅ - 20 KÅ as taught by Applicants invention. Fig. 6 of Ho does not disclose the formation of a bonding pad formed as a single metal layer. Additionally, the 5000Å thickness range of Ho is a thickness range that is very different and extremely far from a thickness range of 10KÅ - 20 KÅ as taught by Applicants invention. Thus, one skilled in the art would have not been motivated by the thickness range of 5000Å of Ho to obtain a thickness in a range 10KÅ - 20 KÅ as taught by Applicants invention. Therefore, Applicants respectfully request that the rejection to claims 2, 9-10 and 12 be withdrawn.

Regarding claims 5-7, the Examiner admitted that Zhao does not disclose a single metal layer comprising a metal-8 layer and at least IMD-1 to IMD-7 layers. The Examiner argued, however, that Zhao discloses a method for forming a wiring bond pad wherein single metal layers comprise metal-4 layers or more (citing column 10, line 33 of Zhao) having

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multilevel IMD 422, 420, 418, 416, and 414 (citing Fig. 4, column 14, lines 29-31 of Zhao), and a copper layer (citing column 14, line 28 of Zhao). The Examiner thus argued that it at the time the invention was made, it would have been obvious to one of ordinary skill in the art to have used a more than four level teaching of Zhao as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range routine experimentation.

Applicants believe that this argument is moot in light of the fact that bonding pad 410 comprises a single metal (M4) but not a single layer, because the entire level region at which bonding pad 410 is located is also shared by a portion of structure 430 and a portion of the area immediately below structure 411. Additionally, a portion of structure 461 (i.e., the white square of Fig. 4) is also located at that same level and layer. Again, Applicants argue that these arguments are irrelevant in light of the fact that neither Ho nor Zhao teach a single layer bonding pad, nor do either reference teach or suggest a such a single layer bonding pad either alone or in combination with one another. Thus, The rejection to claims 5-7 should be withdrawn.

Regarding claims 25, 27-28, the Examiner argued that Zhao discloses a method for forming a wiring bond pad utilized in wire bonding operations on an integrated circuit device comprising the steps of: configuring a wiring bond pad to comprise a single metal layer 410 (citing Fig. 4, column 10, line 37), wherein the single metal layer 410 does not share with any other material, and positioning at least one IC (citing column 10, line 15 of Zhao), below wiring bond pad 410 to thereby conserve IC space and improve wiring bond pad efficiency as a result of configuring the wiring bond pad to comprise a single metal layer 410, locating wiring bond pad above a plurality of IMD layers 422, 420, 418, 416, and 414 (citing Fig. 4, column 14, lines 29-31). Again the Applicants remind the Examiner that wiring bond pad 410 is not a single metal layer. Instead, it is clear from the Fig. 4 structure that the Examiner has frequently cited, that the bonding pad 410 comprises a single metal (M4) but not a single

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layer, because the entire level region at which bonding pad 410 is located is also shared by a portion of structure 430 and a portion of the area immediately below structure 411. Additionally, a portion of structure 461 (i.e., the white square of Fig. 4) is also located at that same level and layer.

The Examiner also admitted that Zhao does not disclose IMD layers that are IMD-1 to IMD-7 layers, and also the step of forming an aluminum buffer film having a thickness in a range of  $10\text{ K}\text{\AA}$  -  $20\text{ K}\text{\AA}$ , and a bonding layer. The Examiner argued, however, that the Ho reference discloses a method for forming a wiring bond pad (citing Fig. 6 of Ho) comprising an aluminum buffer layer 52 (citing column 3, line 3) and a bonding layer 60 (citing column 4, line 53) immediately above a metal layer 30, wherein the aluminum buffer layer has a thickness in a range of  $5000\text{\AA}$  (citing column 4, line 25 of Ho). The Examiner thus concluded that it would have been obvious to one of ordinary skill in the art to use the buffer layer 52 teaching of Ho and Zhao's IMD layers in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation.

Additionally, the Examiner argue that such a buffer layer would have increased the adhesion between the bond pad and bonding layer as taught by Ho (citing column 4, lines 30-32 of Ho). Again, Applicants argue that these arguments are irrelevant in light of the fact that neither Ho nor Zhao teach a single layer bonding pad, nor do either reference teach or suggest a such a single layer bonding pad either alone or in combination with one another. Thus, The rejection to claims 25, 27-28 should be withdrawn.

Regarding claim 26, the Examiner argued that Zhao discloses a method for forming a wiring bond pad wherein the single metal layer 410 comprises a copper layer (citing column 14, line 25 of Zhao), having a thickness of approximately  $10\text{ K}\text{\AA}$  (citing column 14, line 56). ). Again, Applicants argue that these arguments are irrelevant in light of the fact that neither

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Ho nor Zhao teach a single layer bonding pad, nor do either reference teach or suggest a such a single layer bonding pad either alone or in combination with one another. Thus, The rejection to claims 26 should be withdrawn.

The Applicants point out to the Examiner that the language of the references may not taken out of context and combined them without motivation, in effect producing the words of the claims (and sometimes, not even the words or concepts of the claims), without their meaning or context. The resultant combination would not yield the invention as claimed. The claims are rejected under 35 U.S.C. §103(a) and no showing has been made to provide the motivation as to why one of skill in the art would be motivated to make such a combination, and further fails to provide the teachings necessary to fill the gaps in these references in order to yield the invention as claimed. The rejections under 35 U.S.C. §103(a) have provided no more motivation than to simply point out the individual words of the Applicant's claims among the references. Without a basis and reason for rejections to Applicant's claims and specification (e.g., without reason as to why and how the references could be combined to provide the Applicant's invention as claimed), the Examiner's analysis may be viewed as incorporating the benefit of hindsight. Hindsight cannot be a basis for providing motivation, and is not sufficient to meet the burden of sustaining a 35 U.S.C. §103(a) rejection.


Thus, claims 2, 5-7, 9-10, 12 and 25-28 of the present invention are not taught or suggested by Zhao and/or Ho. The features and structures of Zhao and/or Ho cited herein by the Examiner either alone or together fail to teach or yield the invention as claimed. The combination of these references fails to teach or suggest all the elements of the claims. Further, one of skill in the art would not be motivated to make such a combination. Therefore, the present invention is not obvious in light of any combination of Zhao and/or Ho and/or any other well-known components. Withdrawal of the §103(a) rejection is therefore respectfully requested.



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In view of the foregoing discussion, Applicants have responded to each and every rejection of the Official Action, and respectfully request that a timely Notice of Allowance be issued. Applicants have clarified the structural distinctions of the present invention and have demonstrated that their disclosed and claimed invention is novel and non-obvious relative to the prior art. No new subject matter has been introduced as a result of this Response. Applicants respectfully submit that the foregoing discussion does not present new issues for consideration and that no new search is necessitated.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned representative to conduct an interview in an effort to expedite prosecution in connection with the present application. If a telephone conference would be of assistance in advancing the prosecution of this application, the Examiner is invited to call Applicants' attorney at the below-indicated telephone number.



Respectfully submitted,

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